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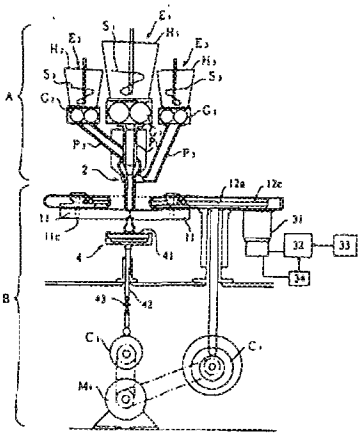
(54) **METHOD AND APPARATUS FOR PRODUCING PLASTIC FOODS.**

(57) A method and an apparatus for producing automatically and highly efficiently plastic foods having various shapes, having or not having, stripe-patterns from a variety of rod-like foods such as a cored-rod foods, which are continuously extruded and consist of at least two kinds of materials.

FIG.1



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TECHNICAL FIELD

The present invention relates to a method and an apparatus for producing a plastic food, in which a series of forming steps can be processed automatically and highly efficiently. The steps include, if necessary, forming stripe patterns on various continuously extruded bar-shaped plastic food such as one with core and skin made of more than two kinds of materials, forming and cutting the various bar-shaped foods into desired shapes.

BACKGROUND ART

For various plastic foods such as cake or confectionery, it is important to please customers through not only the taste but the appearance such as shapes, colours or patterns. In the past, however, there was no apparatus or method to perform mechanically continuous operations which include a delicate forming of the plastic foods, or a fine colouring or patterning on the plastic foods. Thus, such works have been done by hand, which is time-consuming and also very insanitary due to contamination or propagation of germs.

Of course, the following method is known for extruding a plastic food material continuously and cutting this bar-shaped plastic food. That is, several shutters are provided on a polygonal circumference, and while the food material is extruded to an area enclosed with these shutters, the shutters are slid to close, thereby, the food material is squeezed and cut at a desired position (Japanese Utility Model Publication No 29433 of 1988, and Japanese Patent Publication No 42652 of 1989).

In the above method, however, the object of the method was to make sure that the continuously extruded bar-shaped food is cut properly, and particularly, the main feature was a cut and wrap mechanism to cut beautifully at a given position the bar-shaped food with core and skin consisting of two or more types of material without the core material being exposed on the surface. Therefore, the shape of the food produced has been limited to a spherical or rounded cylindrical shape even though the efficiency for producing the food product has improved remarkably.

It is, therefore, an object of the present invention to provide a method and apparatus capable of forming a food product having various shapes using continuously extruded bar-shaped food.

It is another object of the present invention to provide a method and apparatus capable of forming a food product with core and skin having various shapes using a continuously extruded bar-shaped food with core and skin consisting of a plurality of plastic food materials.

It is still another object of the present invention to provide a method and apparatus capable of forming a food product having various stripe patterns on its surface using a continuously extruded bar-shaped food.

It is still a further object of the present invention to provide a method and apparatus capable of forming the food product having various stripe patterns inside the product using the bar-shaped food extruded continuously.

According to the present invention, human skills are not required, and still it is possible to freely design various shapes of the plastic food. Furthermore, it becomes possible to reproduce creatively designed food with identical shapes efficiently and continuously in large quantity.

DISCLOSURE OF THE INVENTION

The present invention discloses a method and apparatus for forming a plastic food. According to the apparatus of the present invention, various bar-shaped foods such as a bar-shaped food with core and skin made of more than two types of material extruded from a unit having a set of nozzles is introduced into a forming and cutting area enclosed with multiple shutters. Then, constrictions having required shape are formed on the peripheral surface of the introduced bar-shaped food by moving the shutters to narrow and widen the area accordingly as required. Then the bar-shaped food with the formed constrictions is cut by shutting the area completely to obtain the plastic food products with various shapes. If necessary, also, the stripe pattern can be added on to the bar-shaped food by attaching a linear food material which is extruded from a nozzle device for the stripe pattern mounted on an outlet of the nozzle unit to the bar-shaped food extruded from the nozzle unit.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a diagrammatic elevational view of an apparatus in its entirety, according to a first embodiment of the present invention,

Figure 2 is a sectional explanatory illustration showing a lower part of the bar-shaped food supply unit according to the first embodiment,

Figure 3 is a perspective explanatory view showing a nozzle device by which a stripe pattern is added on, according to the first embodiment,

Figure 4 to Figure 6 are explanatory views showing a forming and cutting area according to the first embodiment,

Figure 7 to Figure 13 are explanatory views of forming steps showing concrete examples of the method of the present invention according to the

first embodiment,

Figure 14 is a perspective view showing a formed food with stripe pattern obtained by the concrete example of the method of the present invention,

Figure 15 to Figure 20 are side views showing the shape of the formed food obtained by the present invention,

Figure 21 is a sectional explanatory illustration showing a lower part of bar-shaped food supply unit according to a second embodiment of the present invention,

Figures 22 and 23 are explanatory views showing a forming and cutting area according to the second embodiment.

Figure 24 is a sectional explanatory illustration showing a bar-shaped food supply unit according to a third embodiment of the present invention, and

Figure 25 to Figure 27 are explanatory views showing a forming and cutting area according to the third embodiment.

BEST MODE FOR CARRYING OUT THE INVENTION

An apparatus for forming a plastic food according to the present invention comprises a bar-shaped food supply unit (A) and a food forming unit (B). The bar-shaped food supply unit (A) is for continuously extruding a bar-shaped food with core and skin made of two or more types of material while adding a stripe pattern on or inside the food. A food forming unit (B) is for introducing the extruded bar-shaped food into a forming and cutting area and forming and cutting the food to the required shape. The present invention will be described in further detail by way of three embodiments below.

Referring first to Figure 1 to Figure 3, there is shown the bar-shaped food supply unit (A) according to a first embodiment. In the drawing, arrows (E1 to E3) indicate extruders with built-in gear pumps (G1 to G3) and helical flights (S1 to S3). A first food material (f1: soft ice cream), a second food material (f2: white soft and sticky rice cake), and a third food material (f3; red soft and sticky rice cake) disposed in hoppers (H1 to H3) are each pumped under pressure into respective supply passages (P1 to P3). A small nozzle (N1) and a large nozzle (N2) are provided on the respective ends of the supply passages (P1 and P2) for extruding the first and second food materials (f1, f2), and the small nozzle (N1) is mounted with clearance in the large nozzle (N2).

By the above structure, a bar-shaped food with the second food material (f2) wrapping the first food material (f1) is extruded continuously. Then, the third food material (f3) is extruded in lines and attached to the surface of the bar-shaped food with core and skin, forming a stripe pattern on the surface.

A nozzle device (2) for the stripe pattern by which the third food material (f3) is extruded in multiple lines is mounted on an outlet of the large nozzle (N2). The nozzle device (2) has a structure so that a first cylindrical part (21) having nozzle holes (21a, 21a, . . .) is inserted into a second cylindrical part (22). There is a gap forming an annular clearance between the outer surface of the first cylindrical part (21) and the inner surface of the second cylindrical part (22). The annular clearance created by the gap serves as a passage (22a) from which the third food material (f3) is introduced into the nozzle device (2) from the outside. Also, grooves (21b, 21b, . . .) of semi-circular shape in cross-section are bored on the inner surface of the first cylindrical part (21) toward the nozzle outlet from the nozzle holes (21a, 21a, . . .).

By the above structure, the third food material (f3) is supplied under pressure into the inside of the nozzle device (2) from the supply passage (P3) through the passage (22a), and is extruded into a cylindrical part of the nozzle device (2) from the nozzle hole (21a) along the grooves (21b). Thus, the third food material (f3) having line patterns is attached to the surface of the bar-shaped food with core and skin, and the stripe pattern is formed.

Next, referring to Figure 4 to Figure 6 as well as Figure 1, there is shown the food forming unit (B) according to the first embodiment. In the drawing, arrow (1) indicates the forming and cutting area for forming and cutting the extruded bar-shaped food having the stripe pattern. The forming and cutting area (1) is enclosed with four shutters (11, 11, 11, 11) having the same shape, the shutters being symmetrically arranged so as to be pivoted at each corner of a virtual square. Each shutter (11), resembling the shape of a candle flame, has a rounded isosceles triangle shape with a pointed apex, and is pivoted at a pivot axis (11c) that is at the centre of a circular arc forming the base of the isosceles triangle. The vertex of the isosceles triangle farthest from the pivot axis (11c) forms a shutting contact edge (11a), and one of the two equal sides of the isosceles triangle having a circular arc shape forms a cutter blade (11b).

Also, the shutters (11) are arranged so that the shutting contact edge (11a) of each shutter is made to contact the cutter blade (11b) of an adjacent shutter, and the forming and cutting area (1) is formed by each cutter blade (11b) inside the area surrounded by shutters (11, 11, 11, 11).

Each shutter (11) is pivotably joined by a long link part (12a) and three short link parts (12b) having the same shape, one end of the long link

part (12a) being joined to a control motor (31). When the control motor (31) is driven, the link parts (12a, 12b) are moved accordingly, and the four shutters (11, 11, 11, 11) rotate synchronously with the contact edge (11a) contacting the cutter blade (11b). The long and short link parts (12a, 12b) are covered with a link part cover (12c). While protecting the link parts thus, the link parts are separated from the food material for sanitary reasons.

Further, a motor controller (32), a setting unit (33), and a detector (34) are provided on the control motor (31) in order to open and shut the forming and cutting the area (1) accurately (see Figure 1). By inputting setting values such as direction, angle and rotational speed of the control motor (31) to the setting unit (33), the motor controller (32) compares a signal from the detector (34) which detects the angle of a rotary shaft of the control motor (31) with a signal from the setting unit (33), and the control motor (31) is controlled accordingly. By inputting the setting values, therefore, the timing, degree, and speed of opening and shutting of the area (1) can each be set freely as desired. Thus, the bar-shaped food having a stripe pattern, as it descends vertically into the area (1), can be shaped by pressing and constricting intentionally at a desired position. Thus, a bar-shaped food having various shapes can be obtained. The constricted and deformed bar-shaped food is cut by completely shutting the area (1), and the cut food is carried to a given position (toward the rear of the apparatus) by a belt conveyor (4) located below and operates intermittently.

Moreover, the forming and cutting area (1) and the belt conveyor (4) are each designed to perform suitable up-and-down motion by first and second cams (C1 and C2) interlocked with a motor (M1). By using this up-and-down motion, when forming the food, the descending speeds of the bar-shaped food and the forming and cutting area (1) are synchronized. Also, at the time of cutting, the belt conveyor (4) is elevated so that the bar-shaped food is supported from below in order to prevent the bar-shaped food from being torn off by dead weight and exposing the material with core and skin. Also, by adjusting the elevating timing or speed of the belt conveyor (4) as desired, the bar-shaped food can be formed in a still greater variety of shapes (as described later). An elevating rod (42) supporting the belt conveyor (4) has an adjusting bolt mechanism, and by an adjusting dial (43) of the adjusting bolt mechanism, the position of the belt conveyor (4) can be adjusted according to the height of the formed food.

In this embodiment, the forming and cutting area (1) is formed with the contact edge (11a) contacting the cutter blade (11b) forming a contact line rather than a contact plane with the adjacent shutter. Thus, the load for the other mechanisms such as the control motor (31) is reduced since the contact resistance is small when opening and shutting the area (1). Further, there is an additional effect that the food is not prone to clogging inside the forming and cutting area (1) since the contact edge (11a) cleans the plastic food adhering to the cutter side (11b) at each opening and shutting of the area (1).

Next, referring to Figure 7 to Figure 14, there is shown a step of continuously forming and cutting the bar-shaped food with core and skin in the area (1) according to the first embodiment.

The bar-shaped food with core and skin (core material: first food material f1, skin material: second food material f2) having a stripe pattern (third food material f3: not shown in Figure 7 to Figure 13) is continuously extruded into the forming and cutting area (1) enclosed with the shutters (11, 11, 11, 11) (see Figure 7). When the bar-shaped food is extruded to the required position, the shutters (11) rotate by the required angle and then the area (1) reduces by the required amount, thereby the surface of the bar-shaped food is squeezed (see Figure 8). Immediately after this, the shutters (11) rotate back and the area (1) opens. Thus, a constriction is formed around the surface of the bar-shaped food (see Figure 9).

When the bar-shaped food is further extruded, the shutters (11) rotate until the area (1) is completely closed, and thereby the bar-shaped food is cut. Accordingly, a gourd-shaped food having a constriction at a slightly upper middle portion is formed (see Figures 10 and 11).

During the cutting step, the belt conveyor (4), adjusted at a predetermined level by the adjusting dial (43), is elevated in order to support the bar-shaped food, and immediately after cutting, the conveyor (4) descends with the gourd-shaped food on it. Then, a belt (41) operating intermittently carries the gourd-shaped food (see Figures 12 and 13).

By repeating the above forming and cutting step, gourd-shaped foods with core and skin (core material: first food material f1: soft ice cream, skin material: second food material f2: soft and sticky white rice cake) having a stripe pattern (third food material f3: soft and sticky red rice cake) are produced continuously (see Figure 14).

The described embodiment provides the producing step for gourd-shaped food as an example, yet the formed food product made by the apparatus of the present invention is not limited to a gourd shape, but products of a variety of shapes can be produced. Such varieties are shown below (see Figure 15 to Figure 20).

For example, by changing the position of constriction on the extruded bar-shaped food, the ratio

of the sizes of the top and bottom portions of the gourd shape can be easily varied (see Figure 15). Further, forming multiple constrictions allows a food product having a pitted dumpling shape to be formed (see Figures 16 and 17). Also, during the step of forming the constriction (see Figures 8 and 9), if the shutter is kept partially shut while the food continuous to extrude, the part above the constriction becomes large in diameter. A repetition of this step several times allow a pine cone shaped to be obtained (see Figure 18). Again, if during the cutting step of the gourd-shaped food (see Figure 11), the conveyor (4) is elevated beyond supporting the food being cut, it allows the gourd-shaped food to be vertically pressed and thereby a food having a double disk shape can be produced (see Figure 19).

Still more, combined operation of the belt (41) at this time allows the parts above and below the constriction to be horizontally slid and thereby food having a bird shape can be formed (see Figure 20).

Apart from these, in the bar-shaped food supply unit (A), the sectional shape of the large nozzle (N2) for extruding the bar-shaped food can be replaced with various shapes such as a flower shape or a lozenge shape, thereby, a bar-shaped food having an even greater variety of shapes can be formed.

Next, the second embodiment according to the present invention will be described. First referring to Figure 21, there is shown the bar-shaped food supply unit (A).

The bar-shaped food supply unit (A) according to the second embodiment is characterized in that not only a straight stripe pattern but a snaky or spiral pattern can be added on to the surface of the bar-shaped food with core and skin, and such stripe patterns can be formed by two kinds of plastic food materials. In the drawing, arrow (N3) indicates a large rotary nozzle. The large rotary nozzle (N3) is rotatably attached onto the end of the supply passage (P2), and rotated through a nozzle gear (D) driven by a motor (not shown).

A rotation of the large rotary nozzle (N3) imparts a rotary motion to the extruded bar-shaped food by means of friction. In this case, because stripe pattern nozzle device (2), contacting the bottom of the rotary nozzle (N3) through a bearing, is secured against rotation, the bar-shaped food extruded from the rotary nozzle (N3) performs a relative rotation to the food material linearly extruded from the nozzle device (2). Thus, when the rotary nozzle (N3) rotates continuously in one direction, a spiral stripe pattern is formed on the surface of the bar-shaped food. On the other hand, when the rotary nozzle (N3) oscillates back and forth, a snaky stripe pattern is formed on the surface.

The nozzle device (2) according to the second embodiment comprises a first cylindrical part (23) having six nozzle holes (23a, 23a, 23a, 23b, 23b, 23b) on two rows, three nozzle holes on the upper row and three nozzle holes on the lower row, and a second cylindrical part (24) having two corresponding independent passages (24a, 24b). The first cylindrical part (23) is inserted into the second cylindrical part (24) and thereby two annular spaces (passages 24a, 24b) are formed independently. The passage (24a) corresponds to the upper nozzle holes (23a, 23a, 23a) of the first cylindrical part (23), and the passage (24b) corresponds to the lower nozzle holes (23b, 23b, 23b).

Supply passages (P3) and (P4) are respectively connected to the passages (24a) and (24b) of the second cylindrical part (24). The third food material (f3: chocolate) and a fourth food material (f4: marshmallow) are fed into the nozzle device (2) and they are fixed on to the surface of the bar-shaped food with core and skin (core material: first food material f1: soft ice cream, skin material: second food material f2: soft and sticky rice cake). The other parts (for example, extruder) of the bar-shaped food supply unit (A) according to the second embodiment are identical to those of the first embodiment, and thus are not shown.

Next, referring to Figures 22 and 23, there is shown bar-shaped food forming unit (B) according to the second embodiment. Figures 22 and 23 only show the forming and cutting area of the food forming unit (B). The other parts such as the belt conveyor are identical to that of the first embodiment, and thus are not shown.

The forming and cutting area (1) according to the second embodiment is defined by four rectangular shutters (13, 13, 13, 13). Each shutter plate is pivotably mounted on a pivot pin (13b) so as to slide over the others. A cutting hole (13a) is respectively bored closer to the edge of an operating side, and the adjacent corners of a driving side are linked together by linking parts (14, 14, 14, 14). One of the link parts (14) is joined to control motor (31) through a crank mechanism (15). By the above structure, each shutter (13) pivots as desired about its respective pivot pin (13b) upon forward and reverse rotation of the control motor (31). As a result, when each cutting hole (13a) formed on each shutter does not overlap with the others, the area (1) shuts (see Figure 22). When each cutting hole (13a) overlaps with the others, the area (1) opens completely (see Figure 23).

Next, we will explain the first embodiment of the present invention. First, referring to the Figure 24, there is shown bar-shaped food supply unit A.

The bar-shaped food supply unit A according to the present embodiment is characterized by the

fact that the attachment of a stripe pattern to the double layered bar-shaped food is done inside the bar-shaped food rather than on the surface of the bar-shaped food. In other words, the stripe pattern made of the third food material (f3: white rice cake) is formed between the first food material (f1: black rice cake) which is, the core material and the second food material (f2: transparent jelly) which is the outer skin material.

The structure of the bar-shaped food supply unit A according to the present embodiment is almost the same as that of the first embodiment. The only difference is that on the inner surface of the cylindrical piece 25, instead of a groove of semi-circular section that extends downward from the nozzle hole, the present embodiment adopts a nozzle pipe (25a) which projects diagonally downward as shown. By this structure, the third food material (f3) pumped out from the supply passage (P3) is directed inside the bar-shaped food between the first food material (f1) which becomes the core and the second food material (f2) which becomes skin, thus forming a stripe pattern.

Next, referring to the Figure 25 to Figure 27, we will explain bar-shaped food forming unit B according to the third embodiment. Figures 25 to 27 only show the forming and cutting area of the food forming unit (B). The other parts such as the belt conveyor are identical to that of the first embodiment, and thus are not shown.

The forming and cutting area (1) according to the present embodiment is created enclosed by four identically shaped shutters (16, 16, 16, 16) placed symmetrically around a centre point inside a square shutter frame (17). Each shutter has a quadrangular shape having two right angles only. The straight side of each shutter facing the forming and cutting area (1) forms cutting side (16a) and the adjacent side forming a right angle with (16a) forms a sliding side (16b), and another adjacent side forms a long slider side (16c). The cutting side (16a) touches the sliding side (16b) of the adjacent shutter, and the long slider side (16c) of the each shutter touches the inside walls of said shutter frame (17), thus creating the forming and cutting area (1) inside the area surrounded by the cutting sides (16a) of the shutters (16, 16, 16, 16).

The opening and shutting mechanism of this forming and cutting area (1) comprises a transmission piece (17a) fixed to one of the shutters on one end and having an internal thread on the other end, a screw shaft (17b) with a corresponding external thread part at one end, and a control motor (31) that rotates the screw shaft (17b).

Because the shaft (17b) is provided so that it is parallel to an inner wall of shutter frame (17) and its movement in the axial direction is prevented by a stopper (17c), the rotation of the shaft (17b) is transferred to the sliding movement of the shutter guided along the inner wall of the shutter frame (17). Then, the shutter piece to which a sliding movement is imparted presses against the sliding side of the adjacent shutter, and by this pressuring relation extending to all shutters, the four shutters perform linear sliding movements in the respective directions to effect opening and shutting movement of the forming and cutting area (1).

A motor controller (32), a setting unit (33), and a detector (34) provided on the control motor (31) for opening and shutting the forming and cutting the area (1) accurately, are the same as in the first embodiment, and they are not shown. Incidentally, the linear sliding movement can be given to the shutter piece (16) by the forward and backward movement of a pressure fluid cylinder.

The apparatus according to the present invention is by no means limited to these first, second, and the third embodiments and a variety of changes can be made to their designs. For example, the shape of the shutters can be changed according to the stickiness, flexibility, and other characteristics of the each food material, and also according to the shapes to be formed. The forming and cutting area (1) may be provided in many layers by multiplying the shutter mechanism. Also, the forming and cutting area can be made to perform diagonal movements as well as vertical movements, thereby making possible the production of striped formed food with still more numerous varieties of shapes.

Incidentally, the forming and cutting steps performed by the apparatus of the present invention is not relative to the added stripe patterns of the extruded bar-shaped food. Thus, by stopping the extruder from supplying the plastic food to the stripe pattern nozzle device, shaped food products without stripes can be obtained. Of course, with the stripe pattern nozzle device detached, the apparatus is equally capable of shaping the bar shape food freely.

INDUSTRIAL APPLICABILITY

As mentioned above, by the apparatus according to the present invention, food having various shapes can be formed even when the food material has a sticky property (for example, soft and sticky rice cake) provided it has a plastic property. Therefore, the apparatus can be utilized to form wide range of food materials such as bread materials as well as soft rice cake or ice cream.

Claims

1. A method for forming a plastic food, comprising the steps of:

(a) extruding a bar-shaped food made of plastic food material continuously;
(b) introducing the extruded bar-shaped food into a forming and cutting area enclosed with multiple shutters;
(c) forming constrictions having the required shape on the surface of the bar-shaped food introduced into the area by driving each shutter to open and shut the area as desired; and
(d) cutting the bar-shaped food by shutting the area completely.

2. A method as claimed in Claim 1, wherein the shutters are driven by a control motor capable of controlling direction, angle, starting and stopping time of rotation.

3. A method as claimed in Claim 1 or 2, wherein at least three or more shutters having a shutting contact edge at one end of the shutter and a cutter blade extending toward a pivot axis from the contact edge are rotatably arranged with the contact edge of each shutter contacting the cutter side of an adjacent shutter thereby to form the forming and cutting area.

4. A method as claimed in Claim 1 or 2, wherein at least three or more shutters having a cutter side in contact with the bar-shaped food and a contacting side adjacent to the cutter side are arranged so as to perform a linear sliding motion with the cutter side of each shutter contacting the contacting side of an adjacent shutter, thereby to form the forming and cutting area.

5. A method as claimed in Claim 1 or 2, wherein at least two or more shutters having a cutter hole in contact with the bar-shaped food are rotatably overlapped in a contacting condition, thereby to form the forming and cutting area.

6. A method as claimed in any one of Claims 1 to 5, wherein during the extruding step, at least one or more types of stripe pattern consisting of plastic food materials are formed on the bar-shaped food extruded.

7. A method as claimed in any one of Claims 1 to 6, wherein during the extruding step, at least one or more types of stripe pattern consisting of plastic food materials are formed inside the bar-shaped food extruded.

8. An apparatus for forming a plastic food, comprising:
(a) extruding means for extruding a bar-shaped food made of plastic food material continuously;
(b) forming and cutting means for forming constrictions having the required shape on a surface of the bar-shaped food extruded by driving multiple shutters as desired and for cutting the formed bar-shaped food, the forming and cutting means being located below the extruding means.

9. An apparatus as claimed in Claim 8, wherein the shutter is driven by a control motor capable of controlling direction, angle, and starting and stopping time of rotation.

10. An apparatus as claimed in Claim 8 or 9, wherein the forming and cutting means includes at least three or more shutters having a contact edge in a shutting position at the top of shutter and a cutter side extending toward a pivot axis from the contact edge, the shutters being rotatably arranged with the contact edge of each shutter contacting the cutter side of an adjacent shutter, thereby to form the forming and cutting area.

11. An apparatus as claimed in Claim 8 or 9, wherein the forming and cutting means includes at least three or more shutters having a cutter side in contact with the bar-shaped food and a contacting side adjacent to the cutter side, the shutters being arranged so as to perform a linear sliding motion with the cutter side of each shutter contacting the contacting side of an adjacent shutter, thereby to form the forming and cutting area.

12. An apparatus as claimed in Claim 8 or 9, wherein the forming and cutting means includes at least two or more shutters having a cutter hole in contact with the bar-shaped food, the shutters being rotatably overlapped in a contacting condition, thereby to form the forming and cutting area.

13. An apparatus as claimed in any one of Claims 8 to 12, wherein the extruding means comprises a large nozzle for extruding the plastic food materials and a small nozzle mounted with clearance inside the large nozzle, thereby to extrude a bar-shaped food with core and skin made of the plastic food materials.

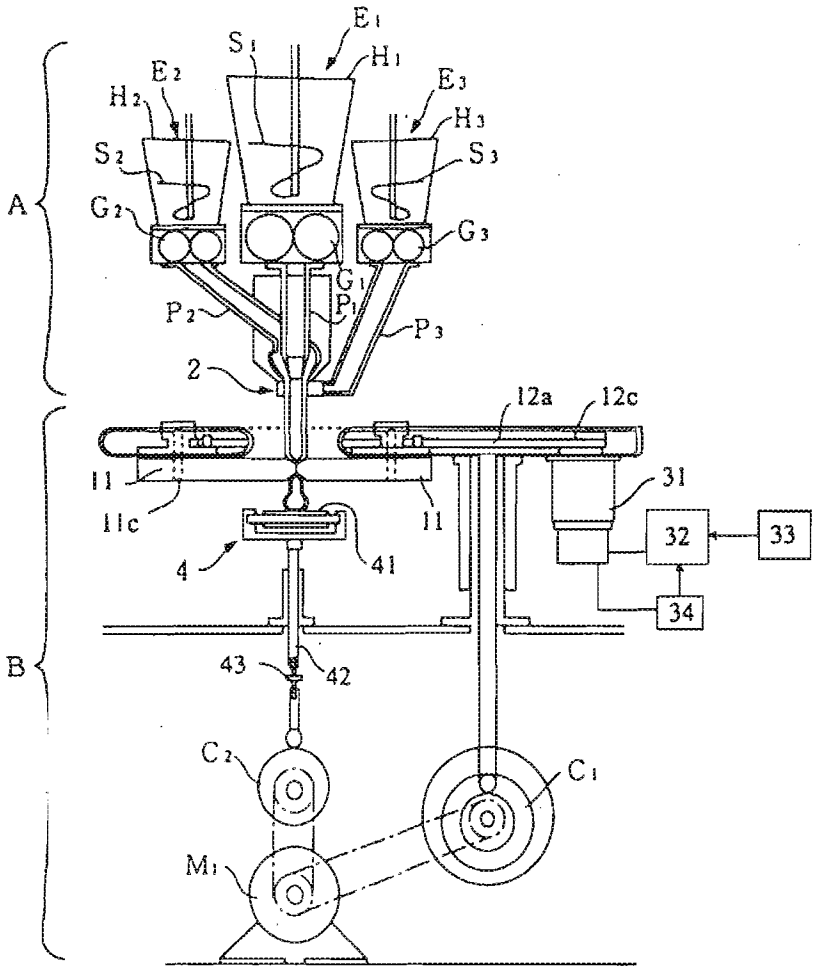
14. An apparatus as claimed in any one of Claims 8 to 13, wherein the extruding means includes a large nozzle for extruding the bar-shaped food and a nozzle device for a stripe pattern

having at least one nozzle hole for extruding a linear food material toward the bar-shaped food, the nozzle device being located adjacent an outlet of the large nozzle.

15. An apparatus as claimed in any one of Claims 8 to 14, wherein the extruding means includes a large nozzle for extruding the bar-shaped food and a nozzle device for a stripe pattern having at least one nozzle hole for extruding linear food material inside the bar-shaped food, the nozzle device being located adjacent an outlet of the large nozzle.

16. An apparatus as claimed in any one of Claims 8 to 15, wherein a large nozzle for extruding the bar-shaped food is rotatably mounted and a nozzle device for a stripe pattern is fixed against rotation, the nozzle device being located adjacent the outlet of the large nozzle.

FIG. 1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H1
E2
H2
S2
G2
E3
H3
S3
G3
G1
P1
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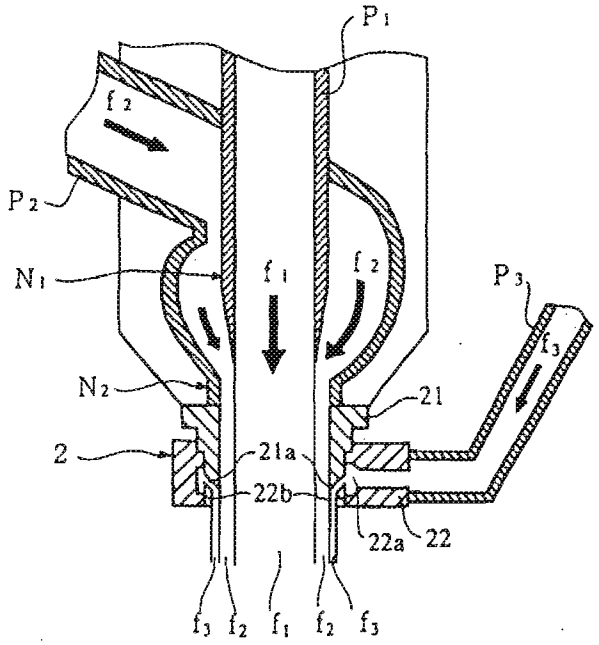
C2
C1
M1

FIG.2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P2
N1
f1
f2
P3
f3
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2
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22b
22a
22
f3
f2
f1
f2
f3

FIG.3

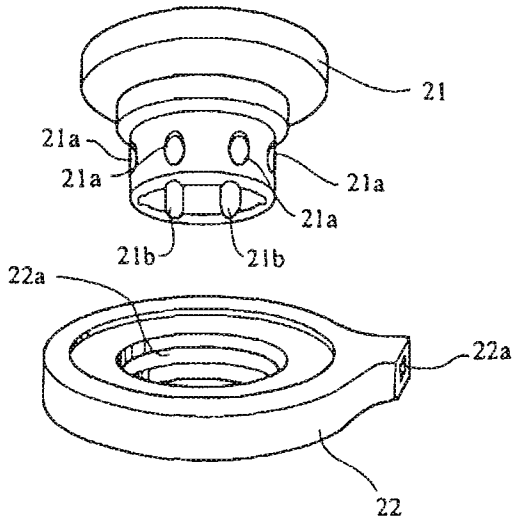
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FIG.4

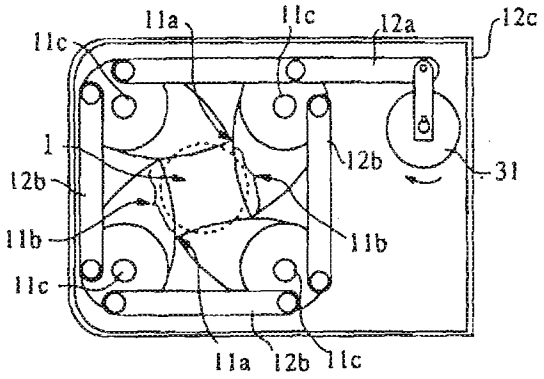

FIG.5

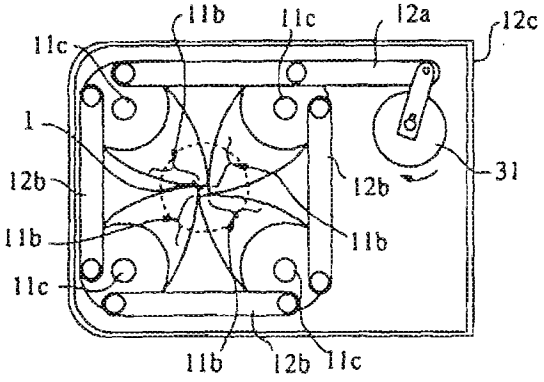

FIG.6

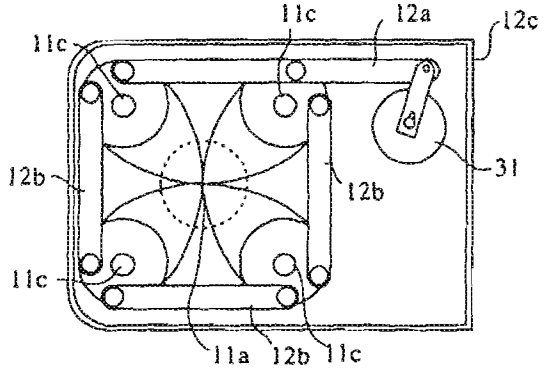

FIG.7

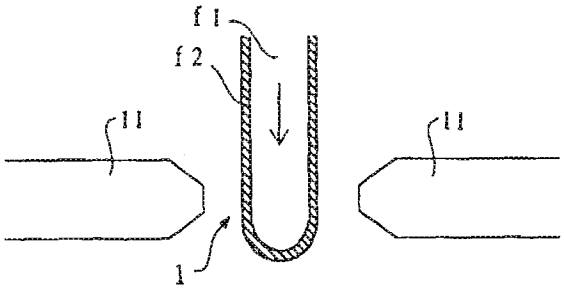

FIG.8

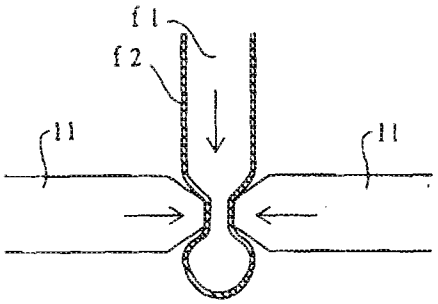

FIG.9

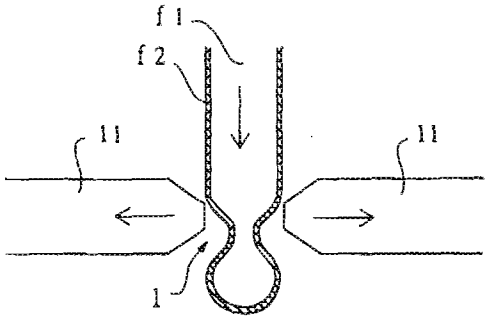

FIG.10

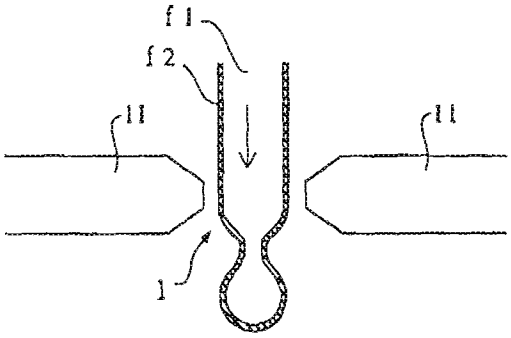

FIG.11

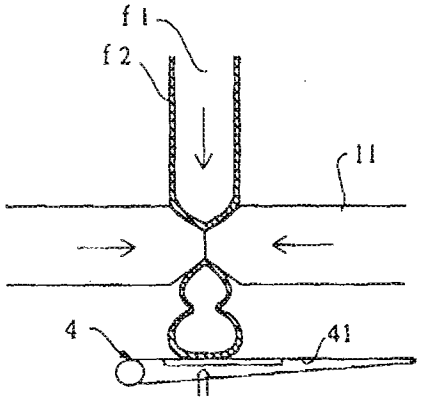

FIG.12

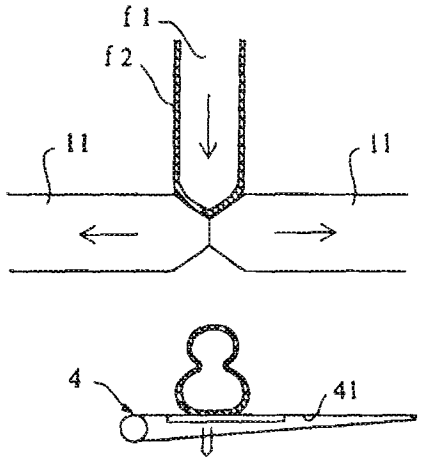

FIG.13

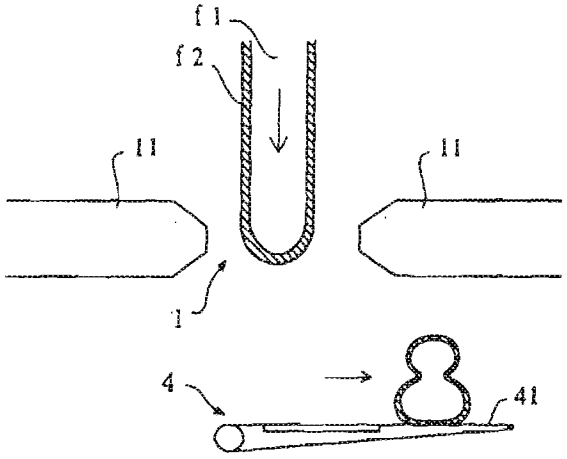

FIG.14

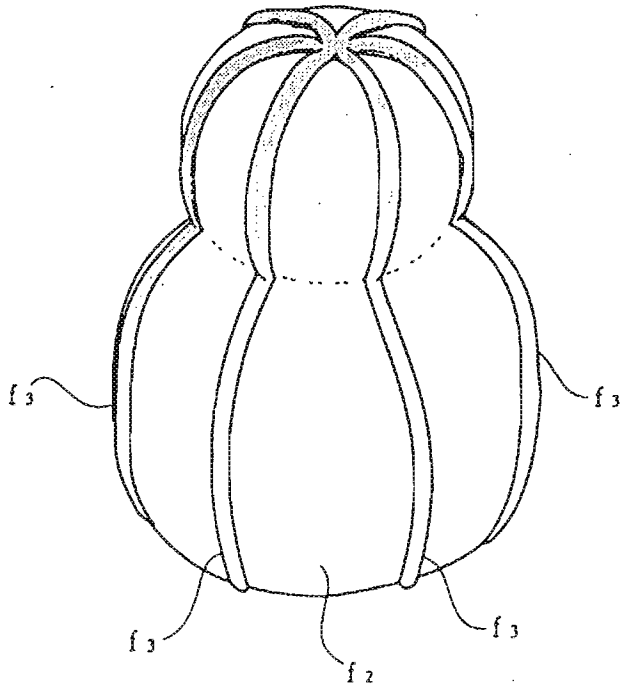

FIG.15

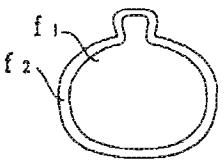

FIG.16

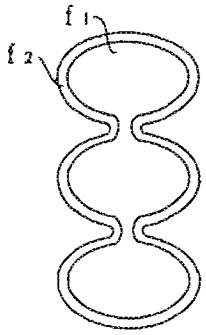

FIG.17

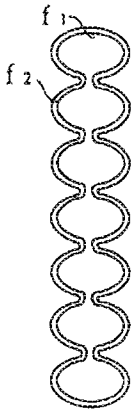

FIG.18

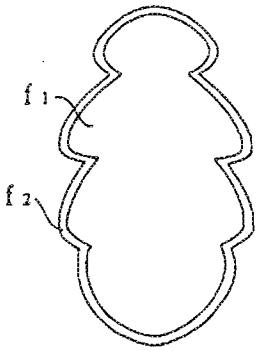

FIG.19

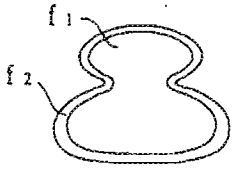

FIG.20

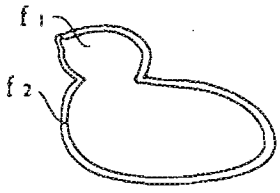

FIG.21

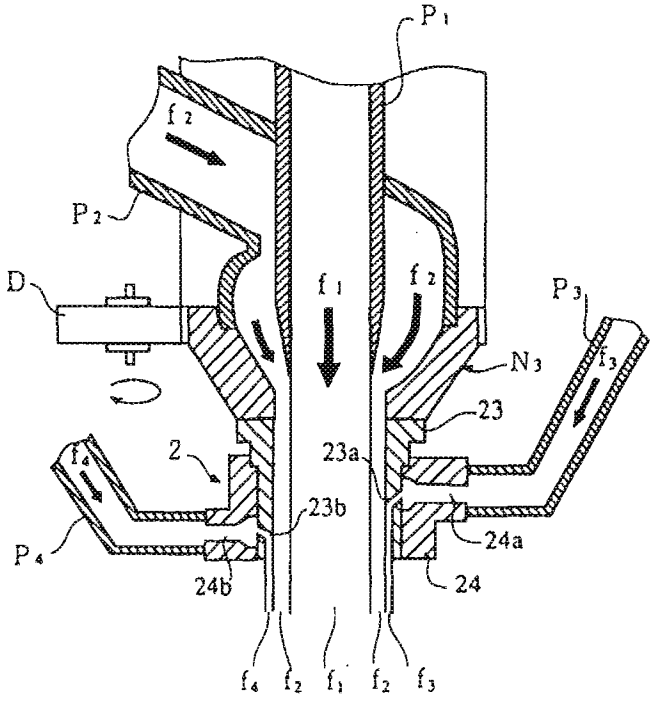

FIG.22

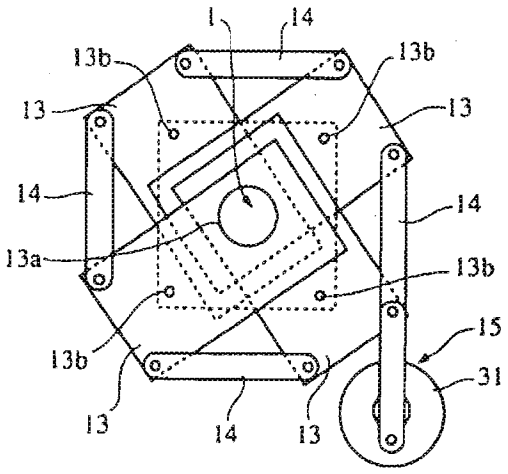
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FIG.23

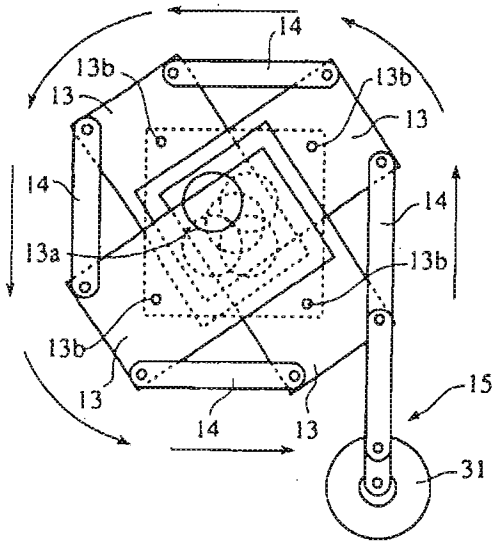
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FIG.24

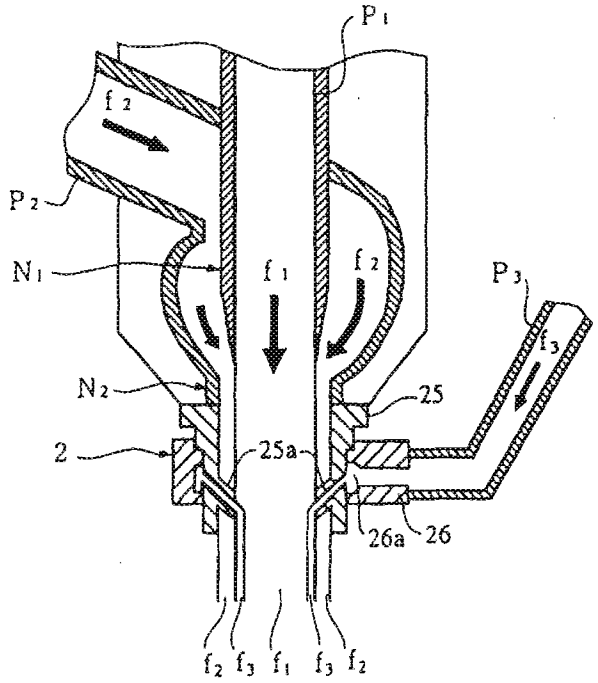


FIG.25

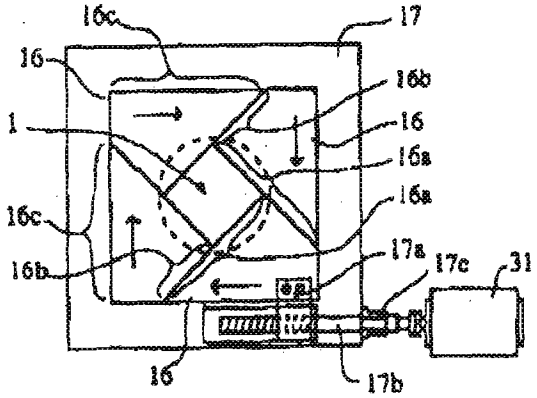


FIG.26

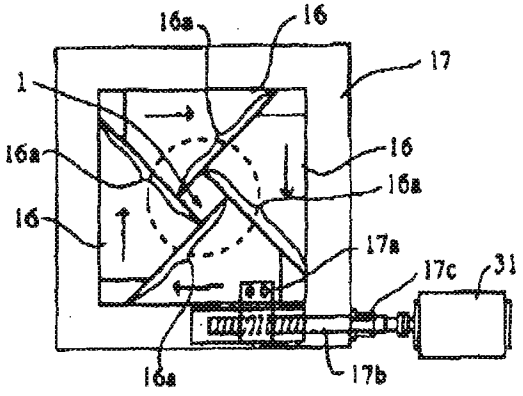
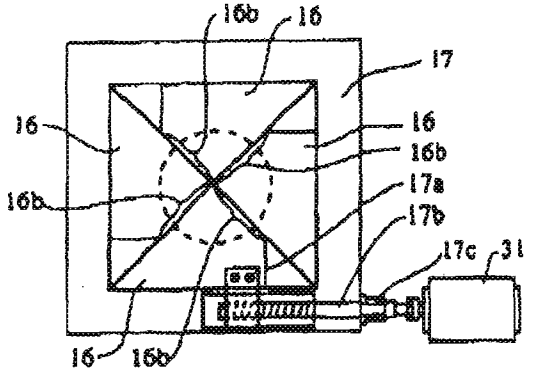


FIG.27



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP93/00644

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl[5] A23P1/12, A23G3/21, A21C9/06, A21C11/16, B26D1/45, B26D1/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Int. Cl[5] A23P1/12, A23G3/21, A21C9/06, A21C11/16, B26D1/45, B26D1/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1926 - 1992
Kokai Jitsuyo Shinan Koho 1971 - 1992

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	JP, A, 1-142682 (Reon Jidoki K.K.), September 29, 1989 (29. 09. 89), (Family: none)	8, 9, 11 12 1-7, 10, 13-16
Y	JP, A, 1-247073 (Masao Kobayashi), October 2, 1989 (02. 10. 89), (Family: none)	12

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
August 9, 1993 (09. 08. 93)	September 7, 1993 (07. 09. 93)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)